REMARKS

Claims 1-10 are pending. No amendment is made herein.

Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kihara et al.(6,627,671) in view of GB-1,204,230. (Office Action, page 2)

As will be explained herein, the claimed invention is chemically different and not obvious from the combined teaching of the cited art.

In the final Office Action, the rejection has been maintained on the same grounds:

The rejection alleges that it would have been obvious for one having ordinary skill in the art to have employed the Amine Mixture of GB-'230 in the preparation of Kihara for the purpose of imparting their reaction curative effects in order to arrive at the product and process of applicants' claims.

As to the pre-blending conditions of applicants' claims, the rejection alleges that Kihara does disclose pre-blending of its polyol with water (column 4 lines 40-42).

As to the variations in the temperature conditions of applicants' processes, the rejection states that Kihara provides for heating of its reactive elements, and it would have been within the skill of the ordinary practitioner to have varied the heating conditions from within the teachings of Kihara.

In response, Applicants respectfully rebuts the rejection for at least the reasons set forth below.

1. The claimed invention and the unexpected results

The claimed invention is to provide a polyol composition for a two-component curable abrasive foam, which exhibits satisfactory dissolution stability, can stably yield a molded article for use as an abrasive foam in a two-component mixing casting machine and can yield a urethane foam abrasive having excellent mechanical properties as an abrasive foam and exhibiting a uniform density distribution.

As a conventional production method of urethane foam for abrasive and polishing pads, a two-component mixing casting machine is generally used. This is because 4,4'-diamino-3,3'-dichlorodiphenylmethane (MBOCA) used herein has a melting point of about 110°C, water has a boiling point of 100°C, and the reaction between the urethane prepolymer and MBOCA

(crosslinking reaction) and the reaction with water (foaming reaction) must occur simultaneously.

In this conventional process, MBOCA must be heated to 110°C or higher so as to liquefy MBOCA to be suitable for mixing. In contrast, water serving as the foaming agent must not be incorporated into the isocyanate urethane prepolymer in advance, since water reacts with the isocyanate. Thus, water is added to MBOCA in advance.

However, water evaporates upon heating of MBOCA at 110°C, i.e., the melting point of MBOCA, or higher so as to liquefy MBOCA. Thus, a desirable foam is not prepared. More specifically, the resulting foamed molded article exhibits increased density variation and lacks uniformity in density distribution which is essential to an abrasive.

In order to solve the problem of the conventional molding method, the claimed invention discloses the polyol composition (1) for a two-component curable abrasive foam (claim 1), which contains the polyol (B) and the polyaminochlorophenylmethane mixture (A) (hereinafter "Mixture (A)") which includes the binuclear compounds, the trinuclear compounds, and tetranuclear or higher polynuclear compounds; and the weight percents of these three group of compounds on the basis of the mixture are 50 to 70%, 20 to 40% and 5 to 10%, respectively. ***The weight ratio of Mixture (A) to the polyol (B) (A/B) is limited at 30/70 to 60/40.*** As a polyol composition (1) ***for a two-component curable abrasive foam,*** the weight ratio of A/B has to be not less than 30/70, because the resulting abrasive foam with enough strength as a polishing pad can not be obtained when using the polyol composition (1) having the weight ratio of A/B less than 30/70.

Mixture (A) is solid at room temperature, and is melted and becomes liquid at 80°C or lower. After adding Mixture (A) into the polyol (B) at the weight ratio of 30/70 to 60/40, it is ***unexpected*** that the resulting polyol compositions (1) of the present invention containing Mixture (A) and polyol (B) are ***transparent and pale brown solutions, and exhibit excellent dissolution stability over a long period of time*** (page 21, the first paragraph of the present application; and Table 1). For example, in Example 1 of the present application, when the ratio is 50/50 (the content of Mixture (A) is 50%), the polyol composition containing the specific Mixture (A) and polytetramethylene glycol (PTMG1000) is kept as a ***transparent and pale brown solution even after 6 months***. In contrast, in Comparative Examples 1, 2 and 3 each comprising a higher content of MBOCA, when the ratio (A/B) is also 50/50, the compositions show hazy turbidity in early stages and precipitation typically of MBOCA and exhibit

deteriorated dissolution stability.

In addition, the polyol composition (1) for a two-component curable abrasive foam of the present application (claim 1) enables molding of a foamed article for abrasive in a simple two-component mixing casting machine.

Moreover, water as a foaming agent, is easy to be added in the polyol compositions (1) of the present invention, and is able to be kept at 80°C or lower before casting. As the result, the composition for a two-component curable abrasive foam of the present invention (claim 4) and the resulting abrasive foam of the present invention (claims 6 or 10) are easy to be produced. For example, in the process for producing the abrasive foam of the present invention (claim 9), it becomes possible to heat the polyol composition (1) containing water (3) at the temperature much lower than the boil point of water (40°C to 70°C) before the step of mixing the two components of polyol composition (1) containing water (3) and the polyisocyanate (2). Therefore, the resulting foamed molded article exhibits satisfactory physical properties and a uniform density distribution, even if the two-component mixing casting machine is used.

2. The present invention (claim 1) , Kihara and GB-'230

Kihara discloses that the active hydrogen-containing compound (C) include, for example, diamine compound (C1) (Column 3, lines 51-58). Kihara also discloses one of the specific diamine compounds, 3,3'-dichloro-4,4'-diamino-diphenylmethane (MBOCA), in Example 1 (Column 8, lines 53-56).

However, ***MBOCA used in Example 1 of Kihara is a single compound***. MBOCA differs from polyaminochlorophenylmethane mixture (A) (***Mixture (A)) of the present invention, which includes the binuclear compounds, the trinuclear compounds, and tetranuclear or higher polynuclear compounds.***

As a comparative example of the present invention, Comparative Examples 2 and 3, in which MBOCA is used as a single compound as similarly as Example 1 of Kihara, show hazy turbidity in early stages and precipitation typically of MBOCA and exhibit deteriorated dissolution stability.

Kihara never discloses nor suggests that it is necessary to use Mixture (A) of the present invention, which includes the binuclear compounds, the trinuclear compounds, and tetranuclear or higher polynuclear compounds in the polyol composition (1) of the present

invention.

Kihara never discloses nor suggests the ***unexpected effect*** that the polyol composition (1) of the present invention used ***Mixture (A)*** instead of a single compound of MBOCA is ***transparent and pale brown solution, and exhibit excellent dissolution stability*** over a long period of time. When the polyol composition (1) is used to produce the composition for a two-component curable abrasive foam of the present invention (claim 4), since no evaporation of water occurs during the process, the resulting abrasive foam, as a foamed and cured product of the composition for a two-component curable abrasive foam, exhibits satisfactory physical properties and a uniform density distribution.

In addition, the difference between Kihara and the present invention is not only about the Mixture (A), but also about ***the whole of the polyol composition (1) itself as disclosed as claim 1***. Kihara never discloses nor suggests the polyol composition (1) for a two-component curable abrasive foam, containing Mixture (A) and the polyol (B) at the weight ratio (A/B) of 30/70 to 60/40. As stated as above in "1. The present invention and the unexpected results", the technical feature of mixing the polyol (B) and the technical feature of using the specific ratio (A/B) are as the same important feature as the feature of using Mixture (A). The unexpected effect of the polyol composition (1) for a two-component curable abrasive foam, as stated as above, is because of the ***combination of the three features***, not any one of the three features independently.

Although GB-'230 discloses the employment of Amine Mixture, and MIXTURE 1 containing polypropylene ether triol (100 parts) and Amine Mixture (21.6 parts) in Example 7, GB-'230 never discloses nor suggests the polyol composition (1) of the present invention (claim 1) containing Mixture (A) and the polyol (B) at the ***weight ratio (A/B) of 30/70 to 60/40***. GB-'230 never discloses nor suggests that the resulting the polyol composition (1) of the present invention is transparent and pale brown solutions, and exhibit excellent dissolution stability over a long period of time, even if the ratio (A/B) is not less than 30/70, as shown in Table 1 of the present invention.

At the end part of the rejection it states that it is not evident in the current showing(s) of record that unexpected results carry to the lower, 30% content value, end points of the claims since the only difference in the comparisons for this value point is an A/B rating after 6 months. The applicant argues that the if ratio (A/B) is lower than the lowest limit of the range, the resulting abrasive foam obtained by the polyol composition having the ratio (A/B) lower than

30/70 has not enough strength to be used as a polishing pad. ***The ratio of 30/70 is critical..***

Therefore, it is not obvious for one having ordinary skill in the art to employ Amine Mixture of GB-'230 instead of using MBOCA in Kihara in the view of GB-'230, and further it is ***not obvious*** for one having ordinary skill in the art to ***employ the specific polyol composition (1) for a two-component curable abrasive foam of the claimed invention*** instead of using MBOCA in Kihara in the view of GB-'230.

Further evidence of this is that although GB'-230 has been published in 1970, 30 years ago before Kihara, Kihara has neither disclosed nor suggested using Mixture (A) of GB-'230, and further, Kihara has neither disclosed nor suggested using the polyol composition (1) of the present invention (claim 1).

3. The present invention (claim 4) , Kihara and GB-'230

Kihara discloses that a mixer having three charge ports is selected to mix three components including the isocyanate compound (B), the compound (C) containing a diamine compound, and water (D). Kihara has to keep water in the third charge port at a mild temperature independent from the component (C) containing diamino compound with higher melt point, in order to control the addition amount of water.

Kihara never discloses nor suggests the composition for a two-component curable abrasive foam, comprising the polyol composition (1) of claim 1, a polyisocyanate (2) and water (3), wherein the composition for a two-component curable abrasive foam, is obtained by adding water (3) in the polyol composition (1); and mixing the polyol composition (1) containing water (3), and a polyisocyanate (2) (claim 4).

The rejection alleges that Kihara generally discloses pre-blending of its polyol with water (column 4 lines 40-42). Kihara only generally discloses that "where a mixer having two charge ports is used, water may be added to the active hydrogen-containing compound (C), followed by charge into a mixer." (Column 4, lines 40-44 of Kihara), as stated as above in "2. The present invention (claim 1), Kihara and GB-'230," Kihara never discloses nor suggest using the Mixture (A). Kihara never discloses nor suggests the specific polyol composition (1) of the present invention. Furthermore, no Example of using the mixer having two charge ports has been disclosed in Kihara.

In fact, water as a foaming agent, is easy to be added in the polyol compositions (1) of the present invention, and is able to be kept at 80°C or lower. So the evaporation of water can be

avoided in order to keep a uniform distribution of water in the composition for a two-component curable abrasive foam before the casting step. As the result, the resulting abrasive foam of the present invention, which has a uniform density distribution and exhibiting excellent mechanical properties, are easy to be produced.

Kihara neither discloses nor suggested the unexpected effect of using the composition of the present invention (claim 4) obtained by pre-blending of the specific polyol compositions (1) containing Mixture (A) with water.

4. The present invention (claim 9) , Kihara and GB-'230

Kihara neither discloses the method for producing an abrasive foam, comprising the 6 steps as disclosed in claim 9 of the present invention.

Regarding to claim 9 of the present invention, Kihara differs from the present invention in at least following four points:

(i) it does not particularly require employment of ***Mixture (A)*** in the polyol composition (1) of the present invention;

(ii) it does not particularly require employment of the ***specific polyol composition (1)*** which contains Mixture (A) and ***polyol (B)*** at the ratio (A/B) of ***30/70 ~ 60/40.***

(iii) it does not particularly require employment of ***the composition for a two-component curable abrasive foam*** (claim 4) in casting step of the method for producing an abrasive foam, the composition is obtained by ***pre-blending*** of the polyol composition (1) with water; and

(iv) it does not disclose the step of heating the polyol composition (1) containing water at ***40 ℃ to 70 ℃***, before the mixing step.

As to the variations in the temperature conditions of applicants' processes, the rejection alleges that Kihara provides for heating of its reactive elements, and it would have been within the skill of the ordinary practitioner to have varied the heating conditions from within the teachings of Kihara.

However, ***Kihara only discloses the conditions of heating the active hydrogen-containing compounds (C)*** in the second liquid tank before they are charged into a mixer having three charge ports, together with charging water and isocyanate-terminated urethane prepolymer in Examples 1-4 and 6. Kihara does not particularly disclose the conditions of heating the

mixture containing the active hydrogen-containing compounds (C) and water because Kihara does not particularly disclose using the two-component mixing casting machine of the claimed invention.

Accordingly, the abrasive foam obtained by the method of the present invention (claim 9) shows the unexpected effect that the resulting abrasive foam has a uniform density distribution and exhibits excellent mechanical properties, which is proved by Examples 3 and 4 in Table 2 of the present application. Kihara never discloses nor suggests the unexpected effect.

Accordingly, reconsideration of this application, especially regarding claims 1, 4 and 9, is respectfully requested.

In view of the above, each of the claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue.

The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 04-1105.

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Respectfully submitted,

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